CHM 129.01
Problem Set # 7

② (a) N_2H_4 (H: +1)

$2(N) + 4(+1) = 0$

$N = -2$

(b) $SnCl_3^-$ (Cl: −1)

$Sn + 3(-1) = -1$

$Sn = +2$

(c) $C_2O_4^{2-}$ (O: −2)

$2(C) + 4(-2) = -2$

$C = +3$

(d) HNO_2 (H: +1, O: −2)

$+1 + 2(-2) + N = 0$

$N = +3$

③ (a) $3\,Fe(NO_3)_2 + 2\,Al_{(s)} \rightarrow 3\,Fe_{(s)} + 2\,Al(NO_3)_3$

(oxidation numbers: Fe +2, N +5, O −2; Al 0; Fe 0; Al +3, N +5, O −2)

Fe: $+2 \rightarrow 0$ reduced

Al: $0 \rightarrow +3$ oxidized

(b) $Cl_2 + 2\,NaI \rightarrow I_2 + 2\,NaCl$

(oxidation numbers: Cl 0; Na +1, I −1; I 0; Na +1, Cl −1)

Cl: $0 \rightarrow -1$ reduced

I: $-1 \rightarrow 0$ oxidized

④ (a) CH_3OH experiences hydrogen bonding, but CH_3SH does not.

(b) Both gases are influenced by London Dispersion Forces. The heavier gas particles, the stronger the London Dispersion Forces. Xe is heavier than Ar so, under theses conditions, Xe is a liquid and Ar is a gas.

(c) Both gases are influenced by London Dispersion Forces. The larger, diatomic Cl_2 molecules are more polarizable, experience stronger dispersion forces, and have a higher boiling point.

(d) Acetone and 2-methylpropane are molecules with similar molar masses and London Dispersion Forces. Acetone also experiences dipole-dipole forces and has a higher boiling point

⑤ (a) Both substances: London Dispersion Forces. C_8H_{18} has a higher boiling point due a greater molar mass.

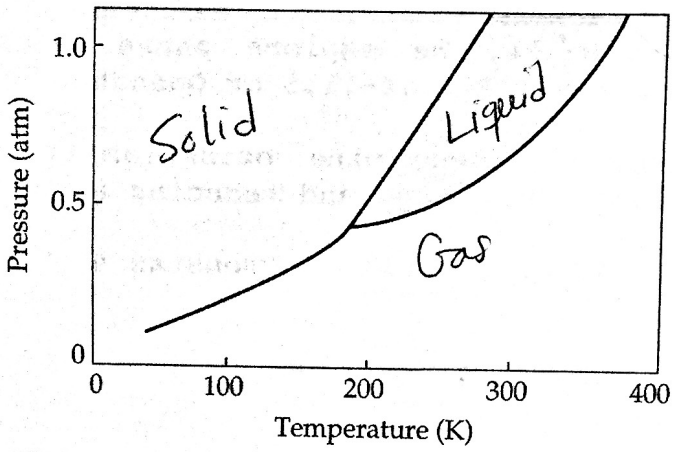
(b) C_2H_6 : London Dispersion Forces; CH_3OCH_3 : Dipole-Dipole & Dispersion
CH_3OCH_3 has the higher boiling point due to stronger intermolecular forces and similar molar mass.

(c) $HOOH$: hydrogen bonding & dispersion; $HSSH$: dipole-dipole & dispersion
$HOOH$ has the higher boiling point due to the influence of H bonding.

(d) NH_2NH_2 : hydrogen bonding & dispersion; CH_3CH_3 : dispersion
NH_2NH_2 has the higher boiling point due to much stronger intermolecular forces.

(6) (a) Condensation (c) Evaporation or vaporization
(b) Sublimation (d) Freezing

(7)



(a) Solid
(b) Gas
(c) T = 190K P = 0.45